Annals of Clinical and Analytical Medicine
Original Research

Evaluation of anxiety and pain levels in patients undergoing colonoscopy in the COVID-19 pandemic

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Abstract
Aim: In this study, we aimed to evaluate factors affecting the anxiety and pain of patients undergoing colonoscopy during the COVID-19 period.
Material and Methods: Before the colonoscopy, patients aged 18-80 years were asked to fill out the Spielberger State-Trait Anxiety Inventory Scale (STAI), along with a personal data form in which demographic data and medical history were questioned, and their pain was questioned with the Visual Analogue Scale (VAS). The pain was questioned in patients who underwent colonoscopy under sedoanalgesia according to VAS after full recovery (Modified Aldrete Score ≥8).
Results: Three hundred and thirty patients (M/F=53/47) with a mean age of 53.41±14.75 years participated in the study. 22.7% of the patients had COVID-19 infection. COVID-19 vaccine was administered to 47.6% of the patients. 85.5% were concerned about COVID-19 transmission during colonoscopy. The mean STAI-S (STAI-State) was 47.49±8.86, and STAI-T (STAI-Trait) was 39.84±8.94 in the patients. The mean VAS score was 2 (0-10) before colonoscopy and 4 (0-10) after colonoscopy. There was no difference in STAI-S, STAI-T, pre and post-colonoscopy VAS scores between those who had COVID-19 and those who did not (p=0.134, p=0.155, p=0.891, p=0.953). There was no difference in STAI-S, STAI-T, and VAS scores between those vaccinated with the COVID-19 vaccine and those not vaccinated (p=0.127, p=0.527, p=0.932, p=0.983). Gender, educational status, STAI-S, STAI-T scores, and colonoscopy waiting time affected VAS scores.
Discussion: Being infected with COVID-19 and being vaccinated with COVID-19 vaccine are not among the factors affecting patients' anxiety and pain.

Keywords
COVID-19, Colonoscopy, Anxiety, Pain, Vaccine

DOI: 10.4328/ACAM.21402 Received: 2022-09-21 Accepted: 2022-10-28 Published Online: 2022-11-10 Printed: 2023-01-01 Ann Clin Anal Med 2023;14(1):25-29
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Introduction

Colorectal cancers are among the most common neoplasms worldwide. Both prevalence and mortality rates are high [1]. Colonoscopy is an indispensable diagnostic tool for evaluating colorectal cancers, premalignant lesions, inflammatory bowel diseases, and other structural lesions of the colon [2]. Despite the advancing technology and the increase in the knowledge and skills of physicians, it is a painful, invasive procedure and may cause patients to feel physically and emotionally uncomfortable. Discomfort and pain during the procedure may cause anxiety in patients undergoing colonoscopy.

The duration of colonoscopy and the level of discomfort experienced by the patient may vary depending on individual anatomical variations, patients' pain threshold, colon sensitivity, and application techniques [3]. Body mass index, gender, age, first colonoscopy experience, general anxiety level, preparation status before colonoscopy, and previous abdominal surgeries can be counted among the determinants of pain felt during the colonoscopy procedure. Sedoanalgesia is applied to patients in many clinics to reduce anxiety and pain during colonoscopy and increase the intervention's tolerability [4].

In addition, the high mortality rates caused by the SARS-CoV-2 infection (COVID-19), which was accepted as a pandemic by the World Health Organization, and affected the whole world, the inability to control the virus, the development of variants, and potential risk increased stress levels, causing fear [5]. During the global pandemic period, serious changes and transformations have been experienced in the health system in Turkey and the world. The burden on healthcare systems by the COVID-19 pandemic has affected many people's access to healthcare. There were difficulties in reaching the physician, delays in invasive procedures, and disruptions in the treatment process. This situation caused anxiety in patients and increased their anxiety levels [6].

This study aims to evaluate the anxiety levels and factors affecting the pain of patients undergoing colonoscopy during the COVID-19 pandemic.

Material and Methods

Approval was obtained from the local ethics committee (2021/03-01) and informed consent was received from the patients' relatives. Three hundred and fifty patients aged 18-80 years, undergoing elective colonoscopy, RT-PCR (-), literate, and accepted to participate in the study were included. Those with psychiatric illnesses or using psychiatric medication were not included. Twenty out of 350 patients who participated in the study were excluded from the study due to incomplete filling of the questionnaires and complications arising from the interventional procedure or anesthesia.

Patients were evaluated before and after colonoscopy. During the pre-procedure period, patients were asked to fill in a personal data form in which demographic data and medical history were questioned, and the Spielberger State-Trait Anxiety Inventory (STAI) scale. The forms were given to the patients an average of half an hour before the procedure so that the participants had enough time to fill in the forms. The patients' pain before and after the procedure was questioned with the Visual Pain Scale (VAS). Midazolam (0.05-0.1 mg/kg, Zolamid®, Defarma, Ankara, Turkey) was given intravenously followed by fentanyl (1 µg/kg, Talinat®, Vem, Istanbul, Turkey) and propofol (1-2 mg/kg, Propofol 1%®, Fresenius Kabi, Austria) as anesthetic agents during colonoscopy. In patients who underwent sedoanalgesia, after full recovery (Modified Aldrete Score≥8) following colonoscopy, the patient's pain was questioned according to VAS.

Spielberger State-Trait Anxiety Inventory Scale (STAI)

The most widely used measure of anxiety is the STAI [7]. The state version asks how the person feels "at the moment", while the trait version asks them to describe "how they feel in general". STAI is a 20-item Likert-type assessment comprising state (STAI-S) and trait (STAI-T) anxiety scales. While in STAI-S, it is scored as "(1) not at all, (2) somewhat, (3) moderately so, and (4) very much so", in STAI-T, it is (1) rarely, (2) sometimes, (3) often and (4) almost always. There are two types of statements in STAI; direct statements indicate negative emotions, and reversed statements indicate positive emotions. While the reversed statements in STAI-S are items 1, 2, 5, 8, 10, 11, 15, 16, 19, 20 and in STAI-T are items 21, 26, 27, 30, 33, 36, 39. The most recent value is the anxiety score, which ranges from 20 to 80. 20-39 points indicate mild anxiety, 40-59 moderate anxiety and 60-79 points indicate high anxiety.

The study was carried out following the Helsinki Declaration criteria, with the approval of the local ethics committee, dated 03/03/2021, and numbered 2021/03-01. An informed consent form was signed by the volunteers participating in the study.

Statistical Analysis

Continuous variables were defined as mean±standard deviation (minimum-maximum), while categorical variables were presented as numbers and frequencies. For normally distributed data analysis of variance (ANOVA) was used to compare the groups. For abnormally distributed data the Kruskal-Wallis analysis was used to compare the groups. Pearson's correlation analysis was used to determine the correlations, and multivariate binary logistic regression analysis was performed to define preoperative and postoperative pain predictors. Statistical Package for the Social Sciences (SPSS) Version 23.0 (SPSS Inc., Chicago, IL, USA) program was used for statistical analysis. $P < 0.05$ was considered significant.

Results

Three hundred and thirty patients with a mean age of 53.41±14.75 years participated in the study. Demographic data and educational status of the patients are shown in Table 1.

22.7% of the patients participating in the study had a COVID-19 infection before, on average 5.81±2.28 months. At least one COVID-19 vaccine was administered to 47.6% of the patients. It was observed that 85.5% of the patients were worried about being infected with COVID-19 in the hospital or during a colonoscopy. While the mean waiting time for colonoscopy was 24.73±11.37 days, 44.2% of the patients stated that they had trouble making an appointment for the procedure, and 8.8% stated an appointment cancellation.

The mean STAI-S score was 47.49±8.86, and the STAI-T score was 39.84±8.94 in the patients. 16.1% (n=53) of the patients felt mild, 75.4% (n=249) moderate, 8.5% (n=25) a high level of status anxiety. The STAI-T scores were 47.9% (n=158) mild,

50.9% (n=168) moderate, 1.2% (n=4). The mean VAS score was 2 (0-10) before colonoscopy and 4 (0-10) after colonoscopy.

The statistical correlation of demographic data with STAI-S and STAI-T scores and pre and post-procedural VAS scores is given in Table 2. While STAI-S was 46.21±9.36, STAI-T 38.48±8.72 in those who had COVID-19, STAI-S was 47.87±8.78, and STAI-T 40.24±8.99 in those who did not have COVID-19. STAI-S and STAI-T values were statistically higher in females (p=0.003, p=0.004).

It was determined that pre- and post-procedural VAS scores were higher in women (p=0.002, p<0.001). It was observed that primary school graduates had higher VAS scores than university graduates before colonoscopy. The VAS scores after colonoscopy were higher in primary and secondary school graduates than in university graduates (Table 2). There was no difference between the time from the decision of colonoscopy to the appointment between those who had COVID-19 and those who did not (p=0.712). It was determined that the increase in the waiting time for colonoscopy caused an increase in the STAI-S value, but a weak correlation was found between them (p<0.001, r=0.177).

There was no difference in STAI-S, STAI-T, and pre- and post-procedural VAS scores between those who had COVID-19 and those who did not (p>0.05). It was observed that vaccination and the number of vaccines administered did not make a difference in terms of STAI-S, STAI-T, and VAS values before and after the procedure (p>0.05) (Table 2)

The Pearson correlation test showed a moderate positive correlation between STAI-S and STAI-T (p=0.000, r=0.511). There was a strong positive correlation between pre- and post-procedural VAS scores (p<0.001, r=0.997). When the STAI-S and T scores were evaluated separately from the pre-procedural VAS scores, it was observed that there was a moderate positive correlation between them (p<0.01; r=0.257, r=0.236, respectively). When VAS scores after colonoscopy were compared with STAI-S and T, they had a moderate positive correlation (p<0.01; r=0.285, r=0.213, respectively). In multiple regression analysis, it was found that STAI-S and T scores, age, and colonoscopy waiting time were factors affecting VAS scores, and pre-procedural VAS scores also affected post-procedural VAS scores (Table 3). Especially, STAI-S and STAI-T were significantly correlated with pre-procedural VAS scores (p=0.003, p=0.025). Pre-procedural VAS score and STAI-S were significant for post-procedural VAS value (p=0.000, p=0.011).

Table 1. Socio-demographic data

Age (years)		49.26±15.51
Gender	Male	175 (53%)
	Female	155 (47%)
Smoking	Yes	94 (28.4%)
	No	236 (71.6%)
BMI classification (kg/m^2)	<25	117 (35.5%)
	25-29	131 (39.7%)
	30-34	70 (21.2%)
	≥35	12 (3.6%)
History of having COVID-19	Yes	75 (22.7%)
	No	255 (77.3%)
COVID-19 treatment	Yes	69 (92%)
	No	6 (8%)
Place of COVID-19 treatment	Home	62 (82.7%)
	Hospital	13 (17.3%)
COVID-19 immunization history	Yes	157 (47.6%)
	No	173 (52.4%)
	1-time vaccination	14 (4.3%)
	2 times vaccination	95 (28.8%)
	3 times vaccination	48 (14.5%)
Educational status	Primary school	151 (45.8%)
	Middle school	59 (17.8%)
	High school	70 (21.2%)
	University	50 (15.2%)

Table 2. Statistical differences between STAI-S and T scores and VAS scores before and after colonoscopy according to demographic data

	STAI-S	STAI-T	VAS	
			Before colonoscopy	After colonoscopy
Gender (Female-Male)	0.003*	0.004*	0.002*	<0.001**
Age groups	0.236	0.727	0.901	0.977
Education groups	0.459	0.512	0.040*	0.003*
BMI groups	0.478	0.285	0.884	0.703
Smoking (Yes-No)	0.887	0.910	0.188	0.070
COVID-19 vaccination (Yes-No)	0.127	0.527	0.932	0.983
Having COVID-19 (Yes-No)	0.134	0.155	0.891	0.953

p-value, *p<0.05, **p<0.001; BMI: Body Mass Index, VAS: Visual Analogue Scale

Discussion

Our study found that gender, educational status, STAI-S, STAI-T scores , and waiting time for colonoscopy affected VAS scores. In addition, there was a strong correlation between the pre-colonoscopy VAS score and the post-colonoscopy VAS score. It was observed that the STAI-S value was affected by gender, STAI-T, waiting time for a colonoscopy, and VAS scores before colonoscopy. It was found that having had COVID-19 and vaccination against COVID-19 did not affect the STAI-S, STAI-T, and VAS scores.

Table 3. Factors associated with VAS and STAI-S scores before and after colonoscopy

		B	Std Error	t	p
VAS before colonoscopy	Constant	-0.994	0.920	-1.080	0.281
	STAI-S	0.510	0.017	3.035	0.003*
	STAI-T	0.037	0.016	2.253	0.025*
	Waiting time for colonoscopy (days)	-0.005	0.011	-0.425	0.671
VAS after colonoscopy	Constant	0.256	0.416	0.615	0.539
	STAI-S	0.020	0.008	2.557	0.011*
	STAI-T	-0.010	0.007	-1.288	0.199
	Waiting time for colonoscopy (days)	0.006	0.005	1.095	0.274
	VAS before colonoscopy	0.936	0.025	37.375	0.000**
STAI-S	Constant	1.212	0.094	Ara.95	0.000**
	VAS before colonoscopy	0.038	0.011	3.555	0.000**
	STAI-T	0.287	0.048	5.954	0.000**
	Waiting time for colonoscopy (days)	0.006	0.002	2.974	0.003*

Linear regression analysis; B: beta coefficient, t: t-test value, constant: regression analysis result value, Std Error: standard error, *p<0.05, **p<0.001; BMI: body mass index; STAI: Spielberger State-Trait Anxiety Inventory (STAI-S: State, STAI-T: Trait); VAS: Visual Analogue Scale

Gender, age, and educational status are among the most discussed parameters concerning preoperative anxiety. When the relationship between preoperative anxiety level and gender was examined in the literature, it was observed that anxiety rates were higher in women [8,9]. The rate of pain and anxiety was higher in women in colonoscopy [10]. In our study, consistent with the literature, STAI-S and T scores and VAS scores were higher in women. Studies have shown conflicting results regarding the effect of age on anxiety and pain [3,11]. Our study found no correlation between STAI-S, T scores, VAS scores, and age. We think this is due to the clinician giving detailed information about colonoscopy to each patient, regardless of age.

In our study, different education levels were ineffective for anxiety, but they affected pain. Literature studies have shown that the preoperative anxiety level does not change at different education levels [5,11,12]. In our study, similar to the studies in the literature, it was seen that the level of education did not affect anxiety before colonoscopy. Studies in the literature show that a low level of education increases the level of pain [13,14]. In our study, it was observed that VAS scores were lower in university graduates after colonoscopy. Although all patients were informed about the procedure by the same trained healthcare team, it is possible that less educated patients could not correctly interpret the information given for colonoscopy or were hesitant to ask for clarification when in doubt, which may explain the higher level of pain at a lower education level.

Pain is an experience that varies according to individual characteristics with physicochemical and emotional components. The severity and intensity of pain are affected by psychological factors. Anxiety is known to be one of the determinants of pain [15,16]. The literature has reported that individuals with high anxiety levels experience more intense pain [17,18]. Most studies have reported that the level of patient anxiety due to colonoscopy is significantly related to the pain experienced during colonoscopy [19,20]. Similar to the literature, in our study, both STAI-S and STAI-T scores were high in patients with high VAS values before colonoscopy. It was observed that the VAS scores after colonoscopy were positively affected by the VAS score and STAI-S scores in the pre-procedural period but not by the STAI-T score. Pain before the procedure will not decrease immediately after a colonoscopy; moreover, because colonoscopy is an invasive procedure, pain may increase. For this reason, patients with high pre-procedural pain levels can be expected to have higher post-procedure pain. In addition, the high level of tension and anxiety before the procedure may increase the pain levels before the procedure and cause intense post-procedure pain.

The COVID-19 pandemic is a global health crisis with high mortality and morbidity rates [21]. Mental health may be adversely affected after the recovery process due to reasons such as restriction of freedom with the quarantine and isolation measures implemented due to COVID-19, staying apart from loved ones, the need to comply with some rules for public health, and fear of death. Depression and anxiety can be seen after COVID-19, but in our study, the anxiety levels of patients who had COVID-19 were similar to those of patients who did not [22,23]. We think this is related to the inclusion in our study of patients with no known psychological problems, no psychiatric diseases, or who do not use drugs.

In the study by Celebi et al. [24], the VAS score was 2 before and 4 after the colonoscopy procedure. In our study, despite a pandemic period, the pre-procedural VAS score was 2 (0-10) and 4 (0-10) after colonoscopy, similar to the results of this study. In the patients participating in the study, it was determined that having had COVID-19, being included in the COVID-19 vaccine program, and the number of vaccinations did not cause any change in the VAS scores of the patients.

Although there were disruptions in the health system for non-pandemic diseases during the fight against the virus for the COVID-19 pandemic, the normalization process has been entered with the spread of disease prevention methods, reduction in virulence, and widespread vaccination. Surgical procedures and daily interventions were restarted to increase patients' quality of life and survival. In studies, the anxiety of being infected with COVID-19 in the hospital was over 60% [5,25]. In our study, the fear of being infected in the hospital during colonoscopy was 85.5%. During the study, there was a 3-week postponement to protect patients and healthcare workers in post-infection elective interventional procedures and anesthesia applications in those who had COVID-19. In our study, no difference was found when the waiting times for colonoscopy were compared between those who had COVID-19 and those who did not. It was observed that those who had COVID-19 were not adversely affected by this process in terms of delaying treatment.

The limitations of our study are that it was single-centered, the number of patients was not high, and it was conducted only in a short period of the pandemic. It will be possible to confirm the results with a multicenter study with larger sample size.

Conclusion

Despite the uneasiness of being infected with COVID-19 in the hospital, with the spread of vaccination and measures to prevent virus transmission in the COVID-19 pandemic, applications to health institutions, have returned to the speed in the pre-pandemic period. Our study observed that having had COVID-19 and being vaccinated with the COVID-19 vaccine did not affect anxiety and pain scores in patients who underwent colonoscopy during the pandemic. It has been observed that the waiting times in the colonoscopy application of patients having COVID-19 or not are similar, and being infected with COVID-19 does not adversely affect the patients' applications for diagnosis and treatment.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Funding: *None*

Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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How to cite this article:

Ayşe Neslihan Balkaya, Füsun Gözen. *Evaluation of anxiety and pain levels in patients undergoing colonoscopy in the COVID-19 pandemic. Ann Clin Anal Med 2023;14(1):25-29*